Fact Sheet:

March 1998

(FL 56)

BUILDING USE CATEGORIZATION AND SCALE-UP SYSTEM (BUCS)

The Problem

Executive Order 12902 requires that large Federal agencies perform energy audits on 10% of their facilities per year. Energy auditors will often reduce audit expense by inspecting a building that is representative (from an energy consumption perspective) of a larger building group. The results of the single prototypical building audit are then scaled-up to the represented group. Selection of the prototypical building often relies on the experience and intuition of the energy manager or the energy auditor. It would be useful to have a tool that provides a consistent and systematic approach for the selection of prototypical buildings.

In addition, the prototypical buildings also provide a starting point for the generation of Federal Energy Decision System (FEDS) input files. FEDS is an energy analysis software package developed at Pacific Northwest Laboratory that assesses energy efficiency potential at large Federal installations. FEDS is a very useful energy analysis tool, however, the manual creation of FEDS input files involves grouping the target installation into building "sets" and inputting

prototypical building data. This can be a very labor-intensive task for a large installation.

The Technology

Building Use Categorization and Scale-up System (BUCS) is a software package developed at the U.S. Army Construction Engineering Research Laboratories (CERL) that uses Army real property data to classify groups of buildings. Following this, a prototypical energy-consuming building is chosen to represent each group. BUCS also contains a utility to automatically generate FEDS input files and some building set data. In addition, BUCS can scale-up the energy use intensity of audited prototypical buildings to produce the total building group energy consumption, and produce installation building demographics in both report and graphical format.

BUCS classifies buildings in the 1995 Integrated Facilities System Mini/Micro (IFS-M) Army real property data by use, intensity (occupancy pattern), age, and size. This results in final groups, or bins, of buildings identified by distinct use, intensity, age, and size categories. BUCS can analyze any of the 50 largest Army installations independently, or bundled within Department of Energy climate zones.

The above sorting process produces bins of buildings that are useful in producing demographics of an Army installation. It is easy to see which building types dominate an installation, or a particular use-group, such as barracks or administration. BUCS provides a graphical facility to visualize the breakdowns.

BUCS selects the "most average" or prototypical building (based on age and size) within each bin to represent the remaining buildings. This prototype building can then be viewed as a likely candidate for an energy audit. If the energy audit produces energy use intensities (energy consumed/ft2/year), BUCS will scale-up the intensities to represent the total energy consumption of the entire building bin.

Because BUCS already has a building grouping routine for Army installations, it was natural to tailor BUCS to create FEDS input files and provide any available building data. BUCS maps its own selected prototypical buildings to FEDS building types, and transforms the represented building bin into a FEDS building set. This option will ease the construction of FEDS input files for the analysis of large Army bases.

BUCS operates within a Windows 3.1, Windows NT, or Win95 operating system. A 486 or better processor and at least 8 MB of RAM are recommended. BUCS versions with 50 Army installations occupies approximately 28 MB of hard drive space.

Benefits/Savings

Use of the BUCS software will provide a more systematic selection routine for targeting specific buildings to be audited within a large installation. Also, if the prototypical scale-up approach is used, the number of buildings audited can be drastically reduced. For example, Fort Hood, TX, an installation consisting of nearly 5,000 buildings, can be reduced to 40 prototypical buildings representing 90% of the total area. In addition, the grouping of buildings required to create a FEDS input file has been automated, reducing the time to create a large input file by approximately 20%.

Status

Version 3 of BUCS, containing all of the capabilities discussed above, has been completed for Army installations. Currently discussions are taking place to include Navy installation data to expand BUCS towards full DoD applicability. Copies of the BUCS program may be obtained by contacting the POC listed below.

Point of Contact

CERL POC is Larry Lister, COMM 217-373-3394; toll-free 800-USA-CERL; e-mail l-lister@cecer.army.mil; or CERL, ATTN: CECER-FL-E, P.O. Box 9005, Champaign, IL 61826-9005.

Visit the CERL homepage at http://www.cecer.army.mil
